Workshop on Advanced Design of Spoke Resonators

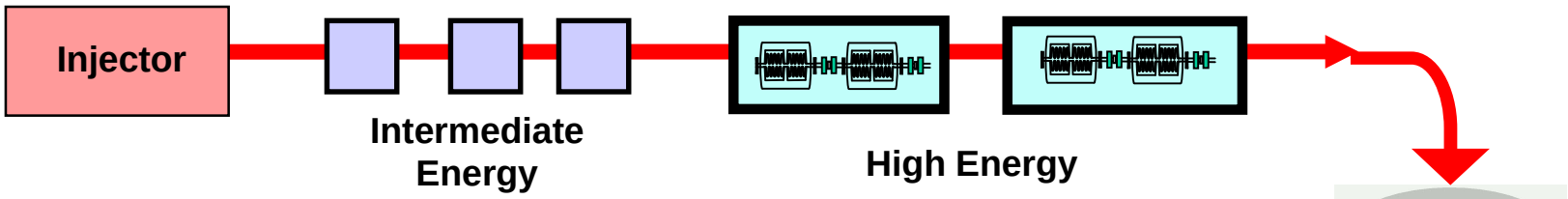
Los Alamos. October 7-8, 2002

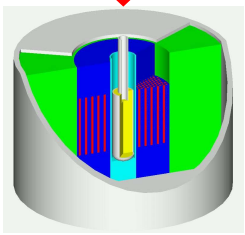
"Status on Spoke Resonators R&D for two European Projects: XADS and Eurisol"

T. Junquera , IPN (CNRS) Orsay, France

CNRS IN2P3

XADS Project





Sub-critical reactor

- European Roadmap published in April 2001
- PDS-XADS phase (5th European FWP) November 2001
- 16 institutions: Laboratories and Industrial Firms
- R&D Program supported in the 6th E.FWP (2003...2006)
- Goals:
  - ❑ **Accelerator preliminary design: 600 MeV, 10 mA max (6 mA in the target)**
  - ❑ **Accelerator architecture optimization**
  - ❑ **Hardware development and tests (demonstrations)**
  - ❑ **Reliability studies**
- Decision for the construction: 2006

EURISOL

European Isotope Separation On-Line Radioactive Nuclear Beam Facility

• The EURISOL project is one of the Research and Technical Development (RTD) projects in Nuclear Physics selected for support by the EU under the 5th Framework. The project is aimed at completing a preliminary design study of the next-generation European ISOL radioactive nuclear beam (RNB) facility.

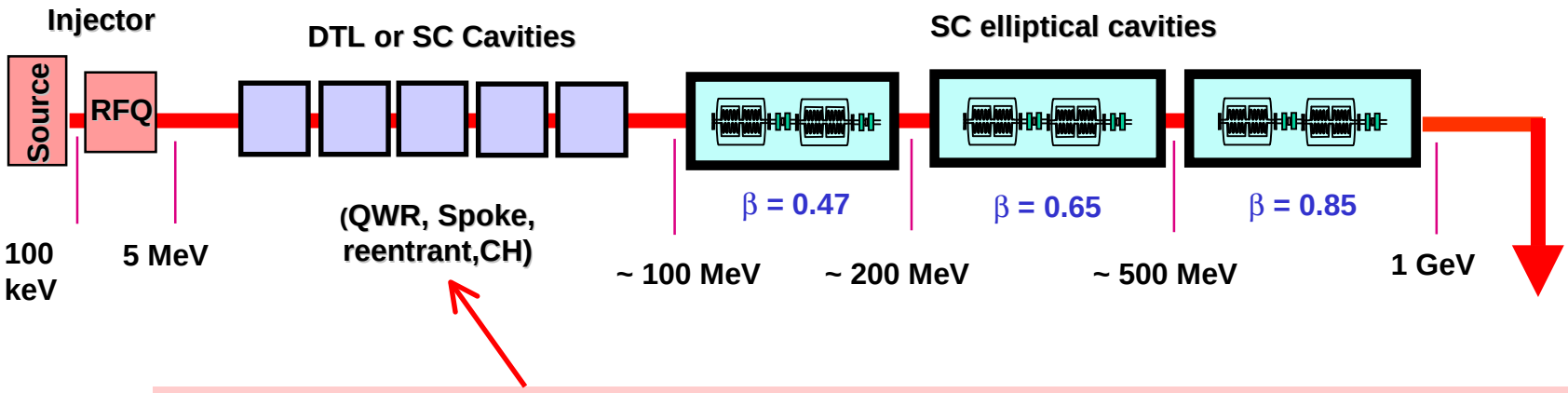
• Collaboration of 11 Laboratories (5 working groups and a steering committee)

- Key experiments (B. Jonsson)
- **Driver accelerator (A. Mueller): protons 1 GeV, 5 mA (CW)**
- Instrumentation for experiments (J. Aysto)
- Isotope separation and post acceleration (M- H. Moscatello)
- Targets and ion sources (H. Ravn)

• Time and financial perspectives

- R&D in the 6th European FWP (2003 ... 2006)
- EU could finance 50% of the project study and 10% of the facility
- **Final report of present "pre- study" for the end of 2002**
- Physics after 2010

Linear Accelerator Generic Scheme



Interest of Spoke Resonators :

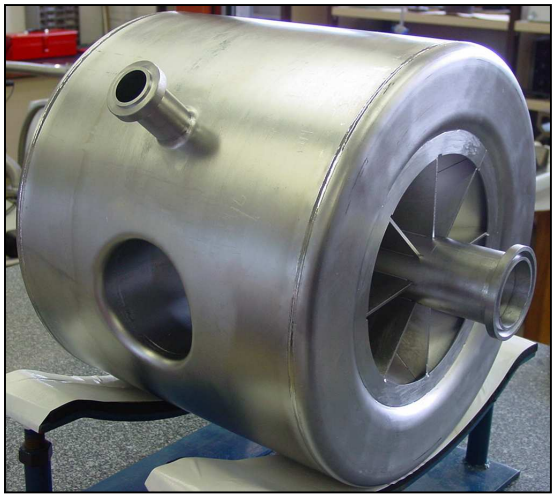
- Large beam aperture
- Mechanical stability
- Negligible steering effects
- Modularity : Independent RF powering and control

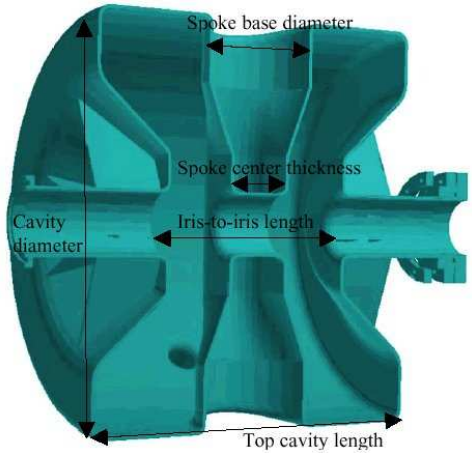
Proposed Intermediate Sections using 2 gaps Spoke Resonators

Beam intensity: 10 mA CW	β=0.15 section	β=0.35 section
Energy range (MeV)	5 - 17	17 - 95
# Cavities	34	62
# Cavities per focusing lattice	1	2
Energy gain per real meter (MeV/m)	0.06 –0.38	0.31 - 1.58
Beam loading RF power (kW/cavity)	0.8 - 5.0	4.1 - 15.0
Overall length (m)	44.2	58.9

Talk of J.L. Biarrotte

First Nb Prototype β = 0.35 (fabricated by CERCA-France)





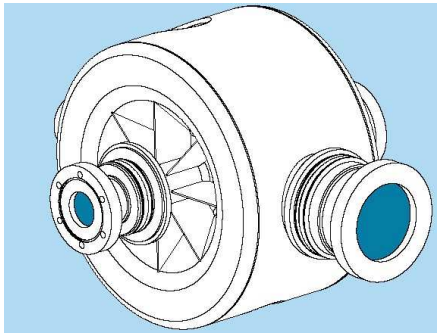
- Delivered in July 2002
- RT tests underway
- 4K tests November 2002

Talks:

- G. Olry : Design
- J. Lesrel : Fabrication
- S. Bousson : Processing

Mid-term R&D Program on Spoke Resonators

- Optimization of the Intermediate Sections Architecture
- Second Nb prototype : β=0.15
  - Design is near completion
  - Preparation of manufacturing aspects (CERCA)



- Collaboration with LANL on a new prototype
- Power Coupler studies
- Cryomodule studies
- Power tests at 4 K